

## IN THE CLAIMS:

Please cancel claim 1 without prejudice.

1. (Cancel) A bioreactor apparatus and cell culturing system, comprising:

a reactor vessel that may be optionally rotated about its axis while allowing the entrance of fresh or recycled fluid and the removal, optionally, of spent medium, medium to be recycled or filtered or unfiltered medium for the collection of samples, said cylindrical reactor vessel consisting of at least a cylindrical wall, two cover plates, two rotary unions, fill ports, a polymeric filter;

means for exchanging gases between the culture medium and ambient gases comprising a user-selected length of permeable tubing and a peristaltic pump;

a polymeric fresh-medium storage bag and peristaltic pump for batch feeding, perfusion or sample collection;

an enclosure and manifold representing an additional level of chemical containment and a series of pinch valves for the periodic collection of samples of suspended cells or cell-free medium;

means for controlling the humidity comprising a humidity control system consisting of a polymeric porous matrix and a fan;

a computer program with graphical user interface for automatically and/or robotically controlling all functions especially including rotation of the reactor vessel, feeding fresh medium, perfusing the reactor vessel, timed collection samples of fluid from the reactor, selecting between collecting cells or cell-free supernatant;

a sealed compartment for sample-collection bags providing a level of chemical containment for safety;

a sealed external housing for all components of the device except power supply and computer; and wherein all polymeric components are made of low-flammability, non-toxic, heat-resistant polymers such as polycarbonate, polysulfone, polypropylene, polytetrafluoroethylene, or silicone.

Please amend claims 2 and 3 as follows:

2. (Currently Amended) ~~The bioreactor apparatus and cell culturing system of claim 1~~  
including

A bioreactor apparatus and cell culturing system, comprising:

a reactor vessel rotatable about its axis comprising a cylindrical wall, opposing cover plates sealing said cylindrical wall, each of said cover plates including a rotary union, at least one fill port, means for filtering cells from a cell containing culture media, means for pumping said culture media thorough said means for filtering;

means for injecting fresh medium or recycled fluid and means for optionally removing spent medium, means for collecting samples of recycled, filtered, or unfiltered medium;

means for exchanging gases between the culture medium and ambient gases comprising a gas permeable tubing and a pump;

means for storing fresh medium;

means for pumping said medium for batch feeding, perfusion or sample collection;

a housing enclosing said reactor vessel;

a manifold extending thorough said housing in fluid connection with said reactor vessel;

valve means for the periodic collection of samples of suspended cells or a cell-free medium;

means for controlling the humidity within said reactor vessel;

computer control means for automatically and/or robotically controlling said reactor vessel functions including optional rotation of said reactor vessel, pumping said medium, perfusing said reactor vessel, collecting samples of medium fluid from said reactor vessel, and selecting between collecting cells or cell-free supernatant;

a sealed compartment in fluid communication with said reactor vessel including means for collecting samples;

a power supply; and

a rotary multiple sample collector with capability for collecting cells on filters, fixing the cells and collecting the cells.

3. (Currently Amended) ~~The bioreactor apparatus and cell culturing system of claim 2;~~

A bioreactor apparatus and cell culturing system, comprising:

a reactor vessel rotatable about its axis comprising a cylindrical wall, opposing cover plates sealing said cylindrical wall, each of said cover plates including a rotary union, at least one fill port, means for filtering cells from a cell containing culture media, means for pumping said culture media thorough said means for filtering;

means for injecting fresh medium or recycled fluid and means for optionally removing spent medium, means for collecting samples of recycled, filtered, or unfiltered medium;

means for exchanging gases between the culture medium and ambient gases comprising a gas permeable tubing and a pump;

means for storing fresh medium;

means for pumping said medium for batch feeding, perfusion or sample collection;

a housing enclosing said reactor vessel;

a manifold extending thorough said housing in fluid connection with said reactor vessel;

valve means for the periodic collection of samples of suspended cells or a cell-free medium;

means for controlling the humidity within said reactor vessel;

computer control means for automatically and/or robotically controlling said reactor vessel functions including optional rotation of said reactor vessel, pumping said medium, perfusing said reactor vessel, collecting samples of medium fluid from said reactor vessel, and selecting between collecting cells or cell-free supernatant;

a sealed compartment in fluid communication with said reactor vessel including means for collecting samples;

a power supply; and

a rotary multiple sample collector with capability for collecting cells on filters, fixing the cells and collecting the cells; and

said rotary sample collector comprising [of] a rotating inlet in fluid communication with [into a] compartment with a filter, means ~~to remove~~ for removing a waste liquid from an input cell suspension, means for collecting cells in chambers in liquid suspension, and means to store fixed cells. ~~for later recovery and examination.~~